(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 583 941 A1**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **93306344.8**

(22) Date of filing : **11.08.93**

(51) Int. Cl.[5] : **F23D 14/28,** F23D 14/38

(30) Priority : **14.08.92 US 930577**

(43) Date of publication of application :
23.02.94 Bulletin 94/08

(84) Designated Contracting States :
DE FR GB IT

(71) Applicant : **NEWELL OPERATING COMPANY**
29 East Stephenson Street
Freeport Illinois 61032 (US)

(72) Inventor : **Coulcher, Richard D., Jr.**
38 Vick Park B., Apartment No.3
Rochester, New York 14607 (US)
Inventor : **Ridley, Michael L.**
3 Day Street
Holley, New York 14470 (US)

(74) Representative : **Heath, Derek James et al**
BROMHEAD & CO. 19 Buckingham Street
London WC2N 6EF (GB)

(54) Self-igniting hand torches.

(57) An economically improved self-igniting torch tip (10) which provides for variable flame sizes through the selection and attachment of interchangeable burn tips (11) and venturis (22). The torch tip (10) also includes a conveniently located and durable built-in self-ignition system (21-24) which is mounted in a heat resistant housing on the outside of the torch tip.

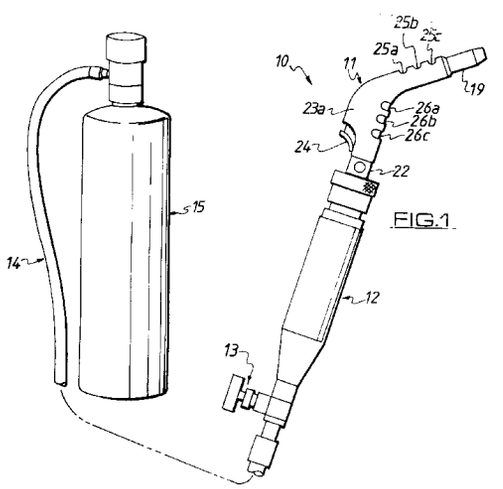


FIG.1

EP 0 583 941 A1

This invention relates generally to hand torches employing a gas fuel such as acetylene, butane or propane. Specifically, the present invention relates to acetylene hand torches that are self-igniting. Even more particularly, the present invention relates to self-igniting air-acetylene hand torches in which the flame size is adjusted by varying the internal geometries of the burn tips and the venturis.

BACKGROUND OF THE INVENTION

Gas torches are well known. Common fuels used for gas torches include acetylene, propane, butane and other light-weight hydrocarbon fuels. Industrial strength torches have commonly employed acetylene as a fuel and combined the gaseous acetylene with oxygen prior to ignition. This oxygen-acetylene system results in a very hot flame suitable for cutting thick metal. Other hydrocarbon fuels such as butane and propane are more suitable for lower temperature flames adequate for home use.

Recently, air-acetylene torches have been developed which produce a flame lower in temperature than oxygen-acetylene torches but do not require a separate pressurized canister for oxygen and therefore the air-acetylene torch systems are more portable than the oxygen-acetylene torch systems. Air-acetylene torch systems are also popular with consumers desiring a hotter flame than propane or butane torch systems.

Hand torches with built-in ignition systems are also known. Prior to the development of built-in ignition systems, the operator of the torch lit the torch with a separate sparking device such as a flint. The sparking device was held out in front of the burn tip after the gas was turned on. This method is not as safe as a built-in method because most built-in methods ignite the gas-air or gas-oxygen mixture inside the burner tube, away from the operator's hands.

Two types of self-ignition devices are currently available. One type offers an ignitor, such as a piezoelectric crystal mounted on the side of the burner tube with an electrode mounted inside the burner tube. A wire connecting the ignitor to the electrode extends down the inside of the burner tube joining the piezoelectric ignitor and the electrode. This system is flawed because a bridge is required to mount the electrode between the side walls of the burner tube. This bridge often interferes with the flow of the flammable fluid mixture in the burner tube thereby interfering with the formation of the flame.

The other built-in ignition system currently available involves mounting the ignitor away from the burner tube toward the handle of the torch. A separate conduit is required that extends from the ignitor to the distal end of burner tube near the burn tip. While this system avoids the disadvantages of running a wire down the inside of the burner tube, it requires the separate conduit for the wire connecting the electrode to the ignitor and further requires a bulky mounting at the base of the torch to accommodate the ignitor.

Yet another problem associated with the prior art is the regulation of flame size. Currently, flame size is regulated in gas torches by changing the torch tips. By definition, a torch tip comprises a burn tip, a burner tube and a venturi. The burner tube connects the venturi to the burn tip. The venturi normally connects the torch tip to a handle or gas source. Most manufacturers offer torch tips in a variety of flame sizes and regulate the flame size by lengthening and shortening the burner tube. Short tubes of small diameters result in a smaller, narrower flame. Longer tubes of larger diameters result in a larger, broader flame.

Altering the burner tube size to alter flame size is not cost effective. Specifically, the burner tube is the largest element of a torch tip. By requiring a different burner tube for each different flame size, the kits offering a variety of torch tips for a variety of flame sizes are unnecessarily expensive due to the high cost of manufacture.

The present invention overcomes this problem by regulating the flame size independent of the burner tube size. Specifically, the burner tube size of the present invention remains consistent and the flame size is adjusted by changing the burner tips and the venturis, which are less expensive to manufacture, and consequently less expensive to modify, than the burner tubes.

BRIEF DESCRIPTION OF THE INVENTION

The present invention makes at least two significant contributions to the art of manufacturing hand torches. First, the present invention provides a superior built-in self-ignition system whereby the ignitor is placed along the burner tube for convenience and the wire connecting the electrode to the ignitor extends along the outside of the burner tube rather than the inside. Second, the present invention provides a means for controlling the size of the flame by altering the burner tips and venturis, as opposed to altering the entire burner tube. Thus, torch tips made in accordance with the present invention are less expensive to manufacture and will last longer because the wire connections of the ignition systems are strategically placed along the outside of the burner tubes. Further, kits of torch tips offering different flame sizes will be less expensive to manufacture because torch tips of different flame sizes will all be made from the same size burner tube.

Specifically, a self-igniting torch tip for connection to a fuel source, such as acetylene or other suitable fuel, is provided. The torch tip includes a burner tube with a burn tip at the distal end and a venturi at the opposing or proximate end. The venturi preferably connects to a standard handle which is connected to the fuel source. The venturi consists of two parts, the venturi tube and the orifice. The venturi tube connects to the standard handle via a quick-connect connection and the orifice is disposed therebetween. The venturi is preferably detachably connected to the burner tube with a threaded connection.

The burner tube extends from the venturi to the burner tip. The burner tip is preferably detachably connected to the burner tube with a threaded connection. The burner tube serves as a support for the ignition system. Preferably, a piezoelectric ignitor is mounted on the outside of the burner tube. The piezoelectric ignitor provides a means for producing an electric potential. A wire connects the piezoelectric ignitor to an electrode. The electrode is inserted through an opening in the burner tube and extends into the burner tube where the fuel-air mixture passes. Thus, the electrode (or the means for producing a spark) is connected by a wire (or an electrical connection) to a piezoelectric ignitor (or a means for producing an electric potential). When the piezoelectric ignitor is activated by pressing a button, an electrical signal is sent through the wire to the electrode where a spark is discharged. In the preferred embodiment, an air-acetylene fluid mixture travels through the burner tube and is ignited by the spark from the electrode.

Only the distal end of the electrode and a portion of the housing supporting the electrode and wire connection enter the burner tube through the opening. Thus, no bridge is required to suspend the electrode in the path of the air-fuel mixture. The electrode arrangement of the present invention is found to interfere less with the flow of the air-fuel mixture and consequently interfere less with flame formation than the bridge constructions taught by the prior art.

In the preferred embodiment of the present invention, the dimensions of the burner tube remain constant. Flame size is adjusted by changing the internal geometries of the burn tips and the venturis. At least two dimensions may be varied in the burn tips: the overall length of the burn tips and the minimum internal clearance. At least two dimensions may be varied in the venturis: the minimum internal clearance of the venturi tube, otherwise known as the through-hole, and the minimum internal clearance of the orifice.

For example, in order to obtain a 1/4-inch flame with the preferred embodiment of the present invention, a burn tip that is about 1 1/2 inches long with a minimum internal clearance of about 1/4-inch is used in combination with a venturi orifice with a minimum clearance of about 0.01 inch with a venturi tube through-hole of about 1/10-inch. Further, in order to properly obtain a 3/8-inch flame with the preferred embodiment of the present invention, the burn tip should be about 1 1/4 inches long with a minimum internal clearance of about 1/3-inch. The venturi for a 3/8-inch flame should include about a 0.015 inch orifice (minimum internal clearance) with a venturi tube having about a 1/8-inch through hole (minimum internal clearance). Finally, to obtain a 1/2-inch flame with the preferred embodiment of the present invention, a burner tip having an overall length of about 1 2/3 inches with a minimum internal clearance of about 1/2 inch should be used in combination with a venturi including an orifice with a minimum internal clearance of about 0.025 inch and a venturi tube through hole, or minimum internal clearance, of about 1/8 inches.

It is therefore an object of the present invention to provide a self-igniting hand torch with an improved ignition system configuration that is cheaper to manufacture and will last longer.

It is another object of the present invention to provide an improved torch tip for hand torches whereby flame size may be adjusted by changing the dimensions of the burn tip.

It is yet another object of the present invention to provide an improved torch tip for hand torches whereby the flame size may be adjusted by changing the dimensions of the venturi.

It is yet another object of the present invention to provide a torch tip for hand torches with improved manufacturing economies and improved ignition system life.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention is illustrated more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a perspective view of a complete flammable fluid torch system including a flammable fluid supply, a fluid supply hose, an industry-standard handle with an adjustable fluid supply valve, and a self-igniting torch tip made in accordance with the present invention;

Figure 2 is a side sectional view of the self-igniting torch tip illustrated in Figure 1 with parts in section;

Figure 3 is an enlarged detailed view of a burn tip as illustrated in Figure 2 having one length and one minimum internal clearance;

Figure 4 is an enlarged detailed view of a burn tip as illustrated in Figure 2 having an alternative length and an alternative minimum internal clearance;

Figure 5 is also an enlarged detailed view of a burn tip as illustrated in Figure 2 having yet another alter-

native length and yet another alternative minimum internal clearance;

Figure 6 is a side view of a burner tube as illustrated in Figure 2;

Figure 7 is a side view of the means for generating an electric potential, or piezoelectric ignitor, shown in Figure 2;

Figure 8 is a top view of the means for generating an electric potential, or piezoelectric ignitor, shown in Figure 7;

Figure 9 is an end view of the means for generating an electric potential, or piezoelectric ignitor, shown in Figure 7;

Figure 10 is an elevational view of the venturi tube illustrated in Figure 2;

Figure 11 is an exploded cross-sectional view of the venturi tube illustrated in Figure 10, including a detailed cross-sectional view of the orifice;

Figure 12 is an end view of the venturi tube of Figure 10, illustrating the tube's minimum internal clearance;

Figure 13 is a right side view of the left half of the outer housing illustrated in Figure 2;

Figure 14 is an end view of the left half of the outer housing as shown in Figure 13;

Figure 15 is a left side view of the right half of the outer housing as illustrated in Figure 2, showing the general placement of the electrical connection and the means for producing a spark, or electrode;

Figure 16 is a view taken substantially along the line 16-16 of Figure 15 showing an enlarged detailed cross-sectional view of the right half of the outer housing as shown in Figure 15 which accommodates the electrical connection;

Figure 17 is a view taken substantially along the line 17-17 of Figure 15 showing an enlarged detailed cross-sectional view of the right half of the outer housing as shown in Figure 15 which supports the means for producing a spark, or electrode; and

Figure 18 is an enlarged detailed cross-sectional view taken substantially along line 17-17 of Figure 15, illustrating the position of the burner tube and the means for producing a spark, or electrode.

DETAILED DESCRIPTION OF THE INVENTION

Like reference numerals will be used to refer to like or similar parts from Figure to Figure in the following description of the drawings.

A complete flammable fluid torch system made in accordance with the present invention is indicated generally at 10 in Figure 1. The system includes a self-igniting torch tip 11, a handle 12, a flammable fluid regulator valve 13, a means for connecting the flammable fluid supply to a handle 14, and a flammable fluid supply 15. It will be understood that the fluid supply canister 15 is shown for illustration purposes only and is not drawn to scale and most supply canisters used with the present invention will be larger than the supply canister 15 shown in Figure 1. During normal operation, the flammable fluid from the supply tank 15 passes through the connecting means 14 and reaches the flammable fluid regulator valve 13. Adjustment of this fluid regulator valve 13 provides for a constant flow of flammable fluid through the handle 12 to the self-igniting torch tip 11. Upon ignition by the torch tip 11, a steady flame is provided at the burn tip 19 (see also Figure 2).

Figure 2 discloses an enlarged view of the self-igniting torch tip 11. The torch 11 comprises a burner tube 20, a burn tip 19 located at the distal end 33 (see also Figure 6) of the burner tube 20, a venturi means 22 located at the proximate end 32 (see also Figure 6) of the burner tube 20, an outer housing 23 affixed to the sides of the burner tube 20, and a piezoelectric ignitor 21 mounted within a lower end 31 of the outer housing 23. Each end 32, 33 of the burner tube 20 has complementary screw threads 36, 35 (see Figure 6) which secure both the burn tip 19 and the venturi means 22 to the burner tube 20.

The outer housing 23 encases the exterior of the burner tube 20 and the piezoelectric ignitor 21. The outer housing 23 is made of a heat-resistant material. The slots 25a, 25b, 25c and 26a, 26b, 26c allow heat from the burner tube 20 to dissipate. Accordingly, the heat which is generated inside the burn tip 19 will not damage the outer housing 23 or the piezoelectric ignitor 21.

One end of the piezoelectric ignitor 21, which extends through the lower end of the outer housing 23, is attached to a pushbutton 24. The push-button 24 and the button actuator 24a are positioned in an aperture 55 in the outer housing 23 so as to provide easy operation for the hand torch user. The push-button 24 is spring biased so the ignitor 21 may be fired repeatedly. The channel 56 in the housing 23 accommodates the wire 39 which provides the electrical connection between the ignitor 21 (or means for generating an electric potential) and the electrode 67 (or means for producing a spark; see also Figure 18).

Referring to Figures 3, 4, and 5 together, the present invention employs interchangeable burn tips, indicated generally at 19. The burn tips 19 have complementary screw threads 29 which engage the distal end 33 of the burner tube 20 (see also Figure 6). The flame holder vane assembly, indicated generally at 30, is disposed inside the outer opening 31 of the torch tip 19. Each burn tip 19 is distinguished by dimensions of

length 27 and minimum internal clearance 28 and the flame size is adjusted by changing the burn tip length 27 and minimum internal clearance 28.

Figure 6 is a detailed view of the burner tube 20 and it discloses an opening 34 which accommodates the electrode 67 (see Figure 18). The opening 34 extends through one side of the burner tube 20 and is located generally near the distal end 33 of burner tube 20 where the interchangeable burn tips 19 are attached. The proximate end 32 of the burner tube attaches to the venturi means 22. Both the burn tip 19 and the venturi means 22 are connected to the burner tube 20 by complementary screw threads 35, 29 and 36, 46 respectively.

Another feature of this invention is the implementation of a piezoelectric ignitor 21 as illustrated in Figures 7, 8, and 9. Activation of the ignitor 21 requires the depression of the spring-biased push-button 24 which, as previously noted in Figure 2, extends through the aperture 55 in the proximate end 31 of the outer housing 23. The electrical charge which is produced within the piezoelectric ignitor 21 is transmitted through the electrical connection 39. The push-button 24 and the electrical connection 39 are securely fastened to the piezoelectric ignitor 21 forming a wholly insulated assembly. An electrical charge is produced by the ignitor 21 as a result of a mechanical strain being imparted onto a piezoelectric crystal (not shown) contained within the housing 21a. The strain is imparted onto the crystal upon depression of the button actuator 24a (see Figure 2) which is mounted on the button 24.

Turning now to Figures 10 and 11, the present invention also includes a unique venturi means 22. The venturi means 22 consists of a venturi tube 43 and an orifice 50. The proximate end 44 of the venturi tube 43 can be attached to a standard handle assembly 12, and the distal end 45 of the venturi tube 43 can be secured to the proximate end 32 of burner tube 20 with the complementary screw threads 46. The distal end 45 of the venturi tube 43 as shown in Figure 11 contains the venturi tube's minimum internal clearance 4g which is commonly referred to as a through-hole 49 (see also Figure 12). The orifice 50 also has a minimum internal clearance 51 and is attached to the proximate end 44 of the venturi tube 43 using complementary screw threads 47, 48. Changes in the minimum internal clearance 49, 51 of both the venturi tube 43 and the orifice 50 also have a direct effect on flame size. Thus, following the preferred procedure, a user can select a specific combination of burn tip 19 and venturi means 22 in order to produce a desired flame size.

Figures 13 and 15 disclose the left 23a and right 23b halves of the outer housing 23, respectively. The slot 59 conforms to the exterior contour of and accommodates the burner tube 20. The aperture 55 at the proximate end 31 of the outer housing 23 provides access to the push-button 24 of the piezoelectric ignitor 21 and the button actuator 24a. Figure 15 discloses a groove 56 which lines the internal wall of the left half of the outer housing 23 and serves to accommodate the electrical connection 39 (see Figures 2, 17 and 18) which extends from the piezoelectric ignitor 21 to the electrode 67 (see Figure 18). For the purpose of securing the electrode 67, a slot 57 is provided at the end of the groove 56 within the internal side of the right half 23b of the outer housing 23. The slot 57 is positioned at a 90° angle with respect to the axis of the burner tube 20 and is centered in the opening 34 of the burner tube 20. The upper end 38 of the ignitor 21 is snugly received in the pockets 52a, 52b of the housing halves 23a, 23b. The slots 52, 53 provide further support for the ignitor 21.

Figure 14 illustrates the proximate end 31 of the left case half 23a of the outer housing 23. Figures 16, 17 and 18 all disclose sections of the right half 23b of the outer housing 23. As seen in Figures 16-18, the groove 56 accommodates the electrical connection 39 and is disposed along the outer edge of the slot 59 that accommodates the burner tube 20. As seen in Figure 17, the slot 57 that supports the electrode 67 (see Figure 18) is disposed in a support base 65. The outer tab 68 of the support base 65 engages the outer periphery 34a of the opening 34 (see Figure 6) of the burner tube 20. As seen in Figure 18, the electrode 67 presents minimal obstruction of the flow of flammable fluid through the burner tube 20.

The use and operation of the invention is as follows.

A user of the self-igniting torch tip 11 will typically require a particular flame size for the work to be performed. Accordingly, the user may exercise his option of selecting a specific burn tip 19 and specific venturi means 22. For example, to obtain a 1/2-inch flame, the user would select a burn tip 19 having a length 27 of about 1 2/3 inches and a minimum internal clearance 28 of about 1/2-inch, and the user would select a venturi tube 43 with a minimum internal clearance 49 of about 1/8-inch and an orifice 50 with a minimum internal clearance 51 of about 0.02 inches. The venturi means 22 is then secured to the proximate end 32 of the burner tube 20 while the burn tip 19 is secured to the distal end 33. Since the burner tube 20, outer housing 23, and piezoelectric ignitor 21 are provided as a one-piece construction, the self-igniting hand torch assembly is now complete and ready for operation.

Due to the economies of manufacture afforded by using the same burner tube 20 for different torch tips 11 of different flame sizes, the present invention will normally be practiced by employing several burner tubes 20 with preselected burner tip 19/venturi means 22 combinations already attached thereto. Accordingly, to change flame size, the user will change the entire torch tip 11 instead unscrewing individual burn tips 19 and/or

venturi means 22 from the burner tubes. Further, because the burn tip 19 will get hot during use, it would be inconvenient, yet possible, for the user to remove a hot burn tip 19 from a burner tube 20.

The proximate end 44 of the venturi tube 43 may then be attached to an industry-standard handle assembly 12. In use, the flammable fluid regulator or valve 13 is opened and combustible fluid from the source 15 is allowed to pass to the self-igniting torch tip 11. The fluid enters the hand torch through the venturi means 22 where it is mixed with air to produce a flowing combustible air-gas mixture. The gas then flows into the burner tube 20 and passes the electrode 67.

Depression of the push-button 24 activates the piezoelectric ignitor 21. The ignitor 21 produces a small electric charge which is then transmitted through the electrical connection 39 to the electrode 67. Subsequently, a small spark is produced at the tip of the electrode 67 in the center of the burner tube 20, and in the midst of the flowing combustible air-gas mixture.

The gaseous mixture is ignited and forms a steady flame at the outermost tip of the burn tip 19. Having selected the requisite burn tip 19 and venturi means 22, the user is provided with the desired flame size.

As noted above, the flame size may be adjusted by varying the venturi means 22 and/or the burn tip 19 without altering the dimensions of the burner tube 20. One or more dimensions of the burn tip 19 and venturi means 22 may be altered to change flame size. Examples of burn tip 19 and venturi means 22 combinations for 1/4, 3/8 and 1/2 inch flame sizes are presented below as approximations for comparison purposes:

Flame size, in.	1/4	3/8	1/2
Burn tip length 27 in. (approx.)	1 1/2	1 1/4	1 2/3
Burn tip clearance 28 in. (approx.)	1/4	1/3	1/2
Through-hole clearance 49 in. (approx.)	1/10	1/8	1/8
Orifice clearance In. (approx.)	0.01	0.015	0.025

Although a single preferred embodiment of the present invention has been illustrated and described (and relatively few variations of the burner tips and venturi means), it will at once be apparent to those skilled in the art that other variations may be made within the spirit and scope of the invention. Accordingly, it is intended that the scope of the invention be limited solely by the scope of the hereafter appended claims and not by the specific wording in the foregoing description.

Claims

1. A self-igniting torch tip for connection to a flammable fluid source, the torch tip comprising:

means for connecting the tip to the flammable fluid source,

a venturi means,

a burner tube,

a burn tip,

an ignitor,

the burner tube having a proximate end and a distal end, the proximate end connecting to the venturi means, the distal end connecting to the burn tip, the burner tube also including an opening for accommodating a means for producing a spark, the opening for accommodating the means for producing a spark being disposed adjacent to the burn tip,

the venturi means introducing air into a flammable fluid flow directed from the flammable fluid source through the burn tip and creating a flammable fluid-air mixture in the burner tube,

the burn tip having a length and a minimum internal clearance,

the ignitor for igniting the flammable fluid-air mixture in the burner tube assembly near the burn tip, the ignitor including the means for producing a spark, a means for generating an electric potential and an electrical connection between the means for generating an electric potential and the means for producing a spark, the means for generating an electric potential and the electrical connection being mounted outside of the burner tube.

2. The torch tip of claim 1,

wherein the flammable fluid is acetylene.

3. The torch tip of claim 1,
wherein the means for generating an electric potential includes a piezoelectric crystal and a means for imparting a mechanical strain to the crystal.

4. The torch tip of claim 3,
wherein the piezoelectric crystal is accommodated within a housing, the means for imparting a mechanical strain to the crystal is mounted on the housing and the crystal is connected to the electrical connection, the electric potential is generated upon activation of the means for imparting a mechanical strain to the crystal.

5. The torch tip of claim 1,
wherein the means for generating an electrical potential, the electrical connection and the burner tube are substantially contained within an outer housing, an aperture in the outer housing providing access to the means for generating an electrical potential.

6. The torch tip of claim 5,
wherein the means for imparting a mechanical strain to the crystal includes a push-button, the push-button extending through the aperture in the outer housing.

7. The torch tip of claim 1,
wherein the venturi means is disposed between the means for connecting the tip to a flammable fluid source and the proximate end of the burner tube, the venturi means including a venturi tube with a proximate end and a distal end, the proximate end of the venturi tube accommodating an orifice, the distal end of the venturi tube being attached to the proximate end of the burner tube, the proximate end of the venturi tube being attached to the means for connecting the tip to a flammable fluid source with the orifice disposed therebetween, the venturi tube having a minimum internal clearance, the orifice having a minimum internal clearance.

8. The torch tip of claim 7,
wherein the torch tip emits a flame, the flame having a flame size, the flame size being a function the minimum internal clearances of the venturi tube and the orifice, the venturi means being removable from the burner tube and replaceable with alternative venturi means having alternative venturi tubes and alternative orifices of different internal minimum clearances for modifying flame size.

9. The torch tip of claim 1,
wherein the torch tip emits a flame, the flame having a flame size, the flame size being a function of the length and minimum internal clearance of the burn tip, the burn tip being removable from the burner tube and replaceable with alternative burn tips of different lengths and different minimum internal clearances for modifying flame size.

10. An improved flammable fluid torch system including a flammable fluid supply, a means for connecting the flammable fluid supply to a handle and a torch tip being attached to the handle, the improvement residing in the torch tip, the torch tip comprising:
means for attaching the torch tip to the handle,
a venturi, the venturi including a venturi tube and an orifice, the venturi tube including a proximate end and a distal end, the proximate end of the venturi tube accommodating the orifice and the proximate end of the venturi tube attaching to the means for attaching the torch tip to the handle with the orifice disposed therebetween, the venturi means introducing air into a stream of flammable fluid directed from the flammable fluid source through the burn tip,
a burner tube, the burner tube including a proximate end and a distal end, the proximate end of the burner tube attaching to the distal end of the venturi tube, the distal end of the burner tube attaching to a burn tip, the burner tube including an opening for accommodating a means for generating a spark,
the burn tip including a length and minimum internal clearance,
an ignitor, the ignitor including the means for generating a spark, a means for generating an electric potential and an electrical connection between the means for generating an electric potential and the means for generating a spark,
the means for generating an electrical potential and the electrical connection being disposed outside of the burner tube.

11. The torch tip of claim 10,

wherein the means for generating an electrical potential, the electrical connection and the burner tube are substantially contained within an outer housing, an aperture in the outer housing providing access to the means for generating an electrical potential.

12. The torch tip of claim 10,

wherein the burn tip and the venturi are both removable from the burner tube and replaceable with alternative burn tips and venturis, the venturi tube having a minimum internal clearance and the orifice having a minimum internal clearance, the torch tip emits a flame of a predetermined size out of the burn tip, the size of the flame being predetermined by minimum internal clearances of the burn tip, venturi tube and orifice and the length of the burn tip.

13. The torch tip of claim 12,

wherein the flame size may be adjusted by removing the burn tip and replacing the burn tip with an alternative burn tip of an different minimum internal clearance and an different length.

14. The torch tip of claim 12,

wherein the flame size may be adjusted by removing the venturi and replacing the venturi with an alternative venturi having a venturi tube and an orifice of an different minimum internal clearances.

15. A self-igniting torch tip for connection to a flammable fluid source, the torch tip emitting a flame of a predetermined size, the torch tip comprising:

means for connecting the tip to the flammable fluid source,

a venturi means,

a burner tube,

a burn tip,

an ignitor,

the burner tube having a proximate end and a distal end, the proximate end connecting to the venturi means, the distal end connecting to the burn tip, the burner tube also including an opening for accommodating a means for producing a spark, the opening for accommodating the means for producing a spark being disposed adjacent to the burn tip,

the venturi means for introducing air into a flow of flammable fluid directed from the flammable fluid source through the burn tip, the flame size a function of the minimum internal clearances of the venturi means,

the burn tip having a length and a minimum internal clearance, the flame size being a function of the minimum internal clearances of the burn tip,

the ignitor for igniting a flammable fluid-air mixture in the burner tube assembly near the burn tip, the ignitor including the means for producing a spark, a means for generating an electric potential and an electrical connection between the means for generating an electric potential and the means for producing a spark, the means for generating an electric potential and the electrical connection being mounted outside of the burner tube.

16. The torch tip of claim 15,

wherein the venturi includes a venturi tube and an orifice, the venturi tube includes a proximate end and a distal end, the proximate end of the venturi tube accommodating an orifice, the distal end of the venturi tube being attached to the proximate end of the burner tube, the proximate end of the venturi tube being attached to the means for connecting the tip to a flammable fluid source with the orifice disposed therebetween, the venturi tube having a minimum internal clearance, the orifice having a minimum internal clearance.

17. The torch tip of claim 16,

wherein the venturi means being removable from the burner tube and replaceable with an alternative venturi means having alternative venturi tubes and orifices of different minimum internal clearances for modifying flame size.

18. The torch tip of claim 15,

wherein the burn tip being removable and replaceable with alternative burn tips of different lengths and different minimum internal clearances for modifying flame size.

19. A method for adjusting a size of a flame emitted from a torch tip used in connection with a flammable fluid source, the torch tip including

a venturi,

a burner tube,

a burn tip,

the burner tube having a proximate end and a distal end, the proximate end detachably connecting to the venturi means, the distal end detachably connecting to the burn tip, the burner tube also including an opening for accommodating a means for producing a spark, the opening for accommodating the means for producing a spark being disposed adjacent to the burn tip,

the venturi including a venturi tube and an orifice, the venturi tube including a proximate end and a distal end, the proximate end of the venturi tube accommodating the orifice and the proximate end of the venturi tube attaching to the means for attaching the torch tip to the handle with the orifice disposed therebetween, the venturi means introducing air into a stream of flammable fluid directed from the flammable fluid source through the burn tip, the orifice having a minimum internal clearance and the venturi tube having a minimum internal clearance, the flame size being a function of the minimum internal clearances of the orifice and the venturi tube,

the burn tip having a length and a minimum internal clearance, the flame size being a function of the length and minimum internal clearance of the burn tip,

the method comprising:

disconnecting the venturi from the burner tube and connecting an alternative venturi to the burner tube, the alternative venturi having an orifice with an alternative minimum internal clearance and a venturi tube with an alternative minimum internal clearance.

20. The method of claim 19,

further including

disconnecting the burner tip from the burner tube and connecting an alternative burner tip to the burner tube, the alternative burner tip having an alternative minimum internal clearance and an alternative length.

21. A method for adjusting a size of a flame emitted from a torch tip used in connection with a flammable fluid source, the torch tip including

a venturi,

a burner tube,

a burn tip,

the burner tube having a proximate end and a distal end, the proximate end detachably connecting to the venturi means, the distal end detachably connecting to the burn tip, the burner tube also including an opening for accommodating a means for producing a spark, the opening for accommodating the means for producing a spark being disposed adjacent to the burn tip,

the venturi including a venturi tube and an orifice, the venturi tube including a proximate end and a distal end, the proximate end of the venturi tube accommodating the orifice and the proximate end of the venturi tube attaching to the means for attaching the torch tip to the handle with the orifice disposed therebetween, the venturi means introducing air into a stream of flammable fluid directed from the flammable fluid source through the burn tip, the orifice having a minimum internal clearance and the venturi tube having a minimum internal clearance, the flame size being a function of the minimum internal clearances of the orifice and the venturi tube,

the burn tip having a length and a minimum internal clearance, the flame size being a function of the length and minimum internal clearance of the burn tip,

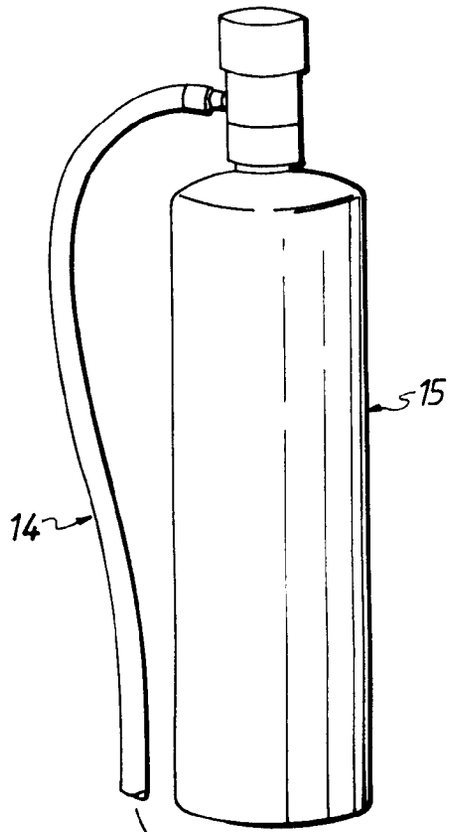
the method comprising:

disconnecting the burner tip from the burner tube and connecting an alternative burner tip to the burner tube, the alternative burner tip having an alternative minimum internal clearance and an alternative length.

22. The method of claim 21,

further including

disconnecting the venturi from the burner tube and connecting an alternative venturi to the burner tube, the alternative venturi having an orifice with an alternative minimum internal clearance and a venturi tube with an alternative minimum internal clearance.



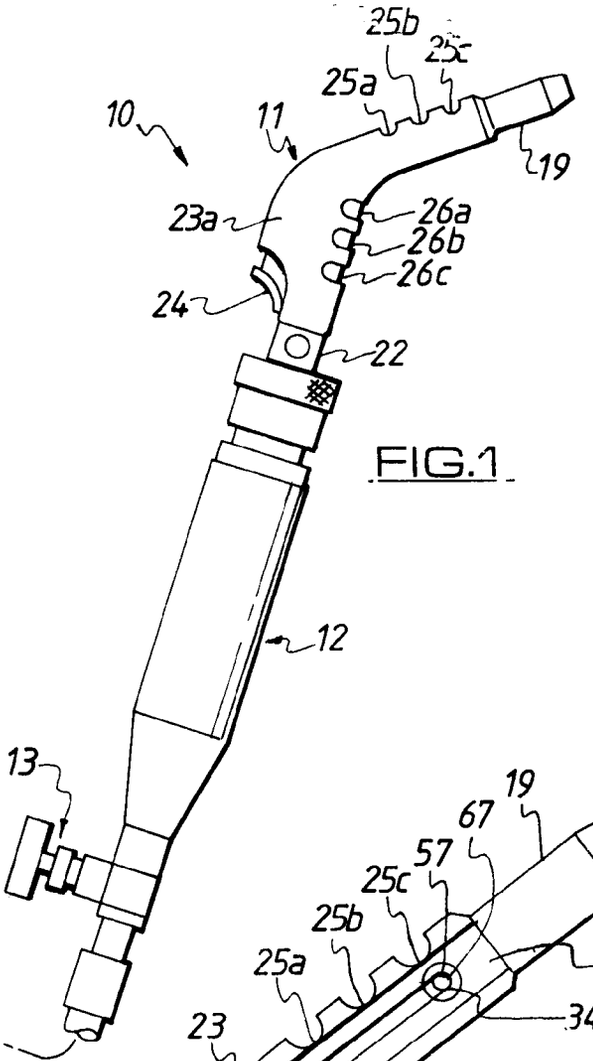


FIG.1

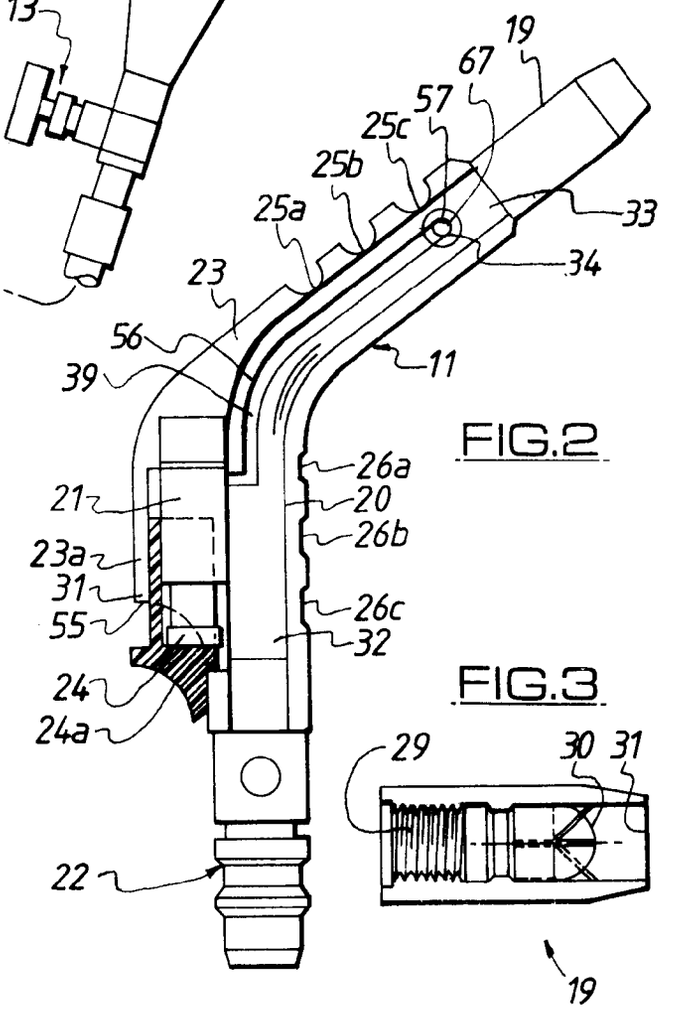


FIG.2

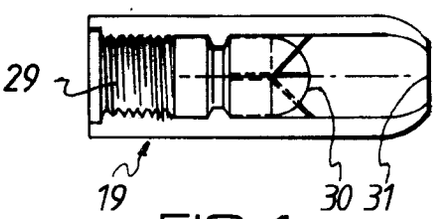


FIG.4

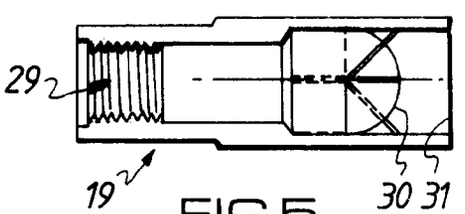


FIG.5

FIG.3

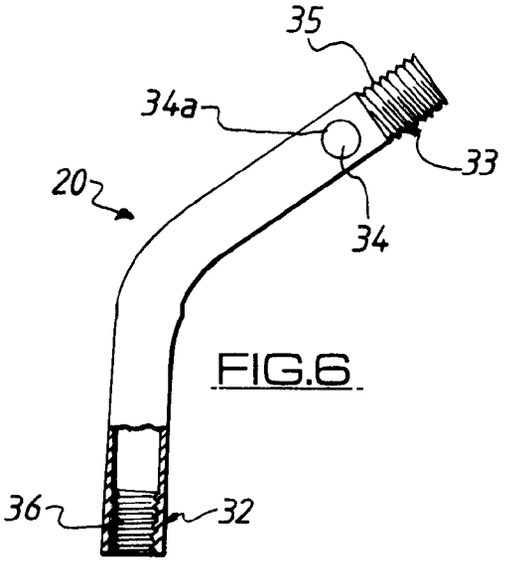


FIG.6

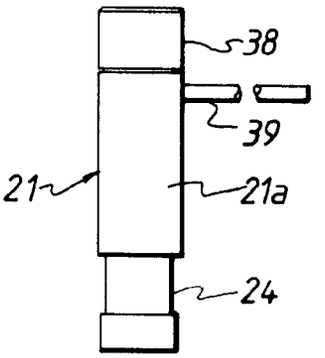


FIG.7

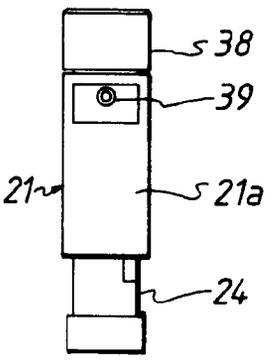


FIG.8

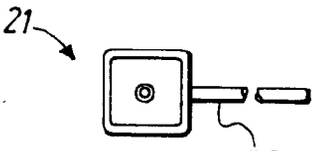


FIG.9

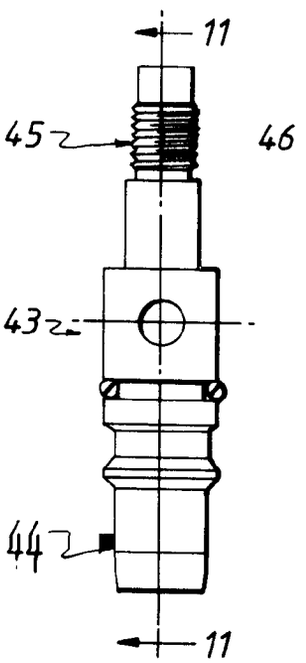


FIG.10

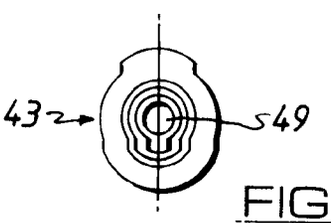


FIG.12

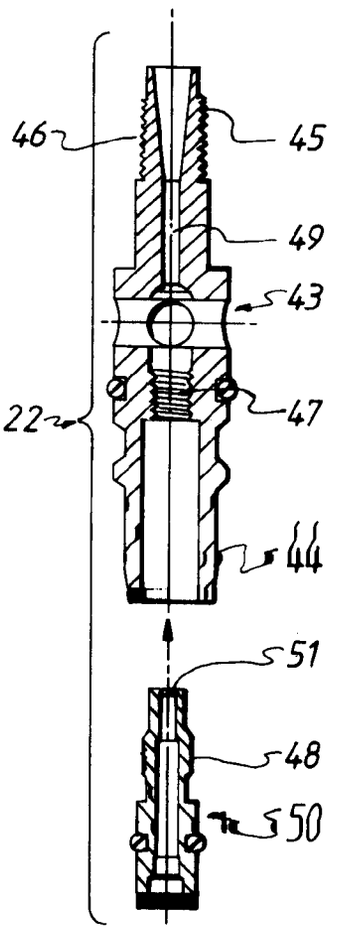


FIG.11

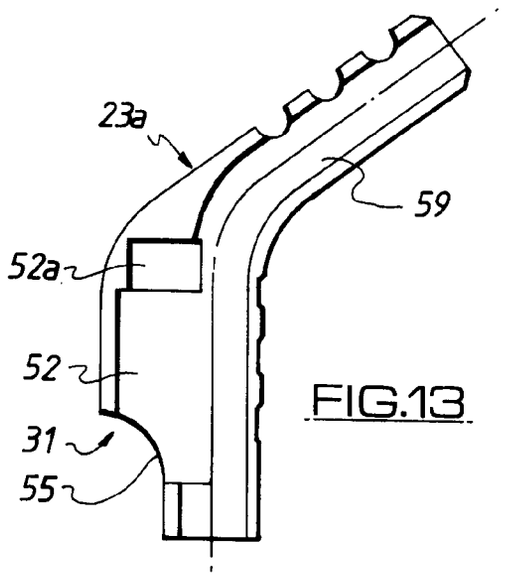


FIG.13

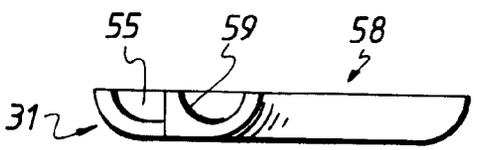


FIG.14

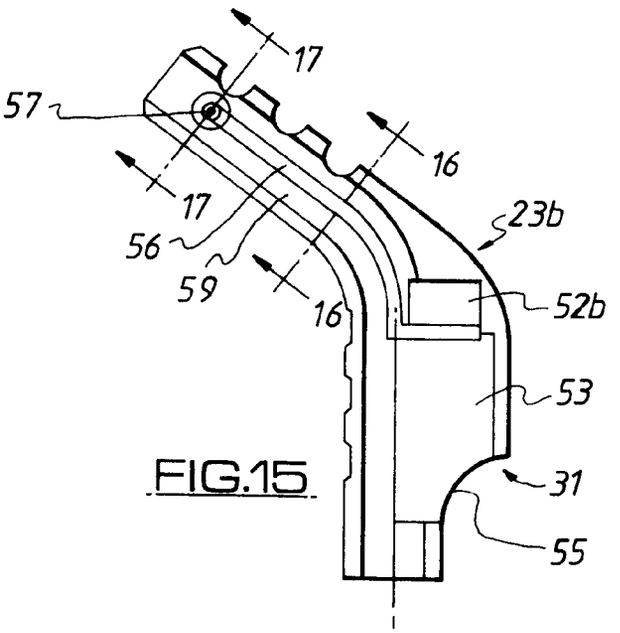


FIG.15

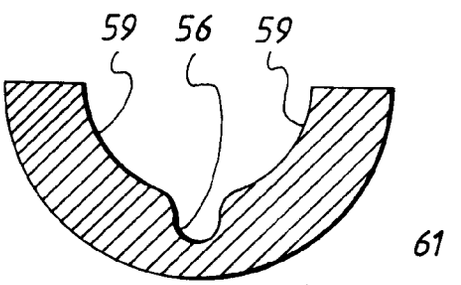


FIG.16

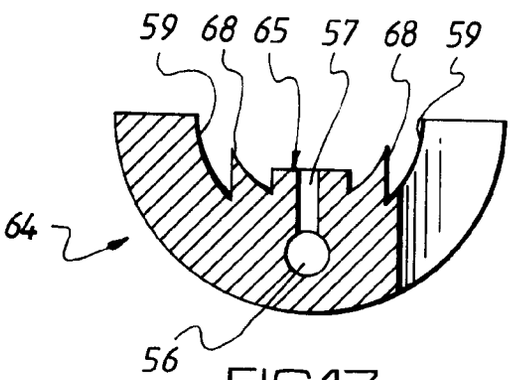


FIG.17

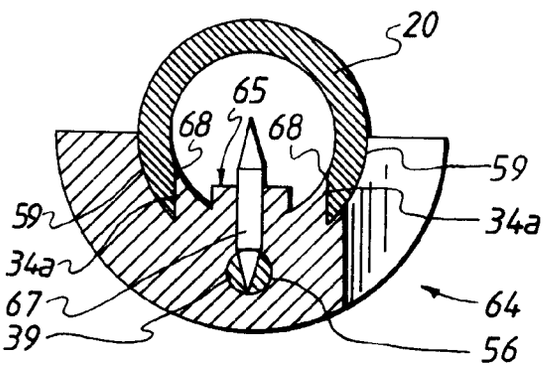


FIG.18

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 93 30 6344

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X Y	US-A-4 526 532 (J. M. NELSON) * column 3, line 19 - column 8, line 12; figures 1-8 *	1,3-6 7-21	F23D14/28 F23D14/38
Y	US-A-5 123 837 (G. R. FARNHAM ET AL) * column 3, line 16 - column 10, line 19; figures 1-5 *	7-21	
A	GB-A-2 080 935 (H. C. MILLER) * page 1, line 120 - page 4, line 7; figures 1-7 *	1-22	
A	PATENT ABSTRACTS OF JAPAN vol. 10, no. 167 (M-488)(2223) 13 June 1986 & JP-A-61 017 822 (KOIKE SANSO KOGYO K. K.) 25 January 1986 * abstract *	7-21	
A	F. WUTTKE 'Die Gas- Schweissung in Frage und Antwort' 1962 , VEB VERLAG TECHNIK , BERLIN, DE 10. AUFLAGE * page 84, line 3 - page 85, line 34 *	7-21	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

F23D
F23Q

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
BERLIN	25 NOVEMBER 1993	WUNDERLICH J.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)